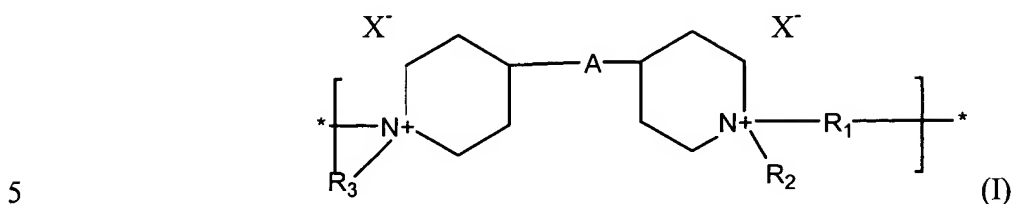


What is claimed is:

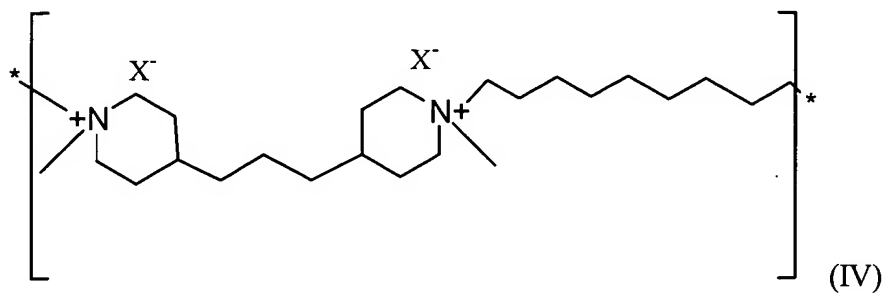
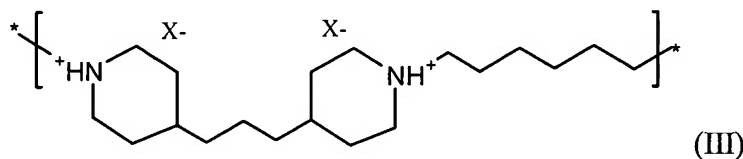
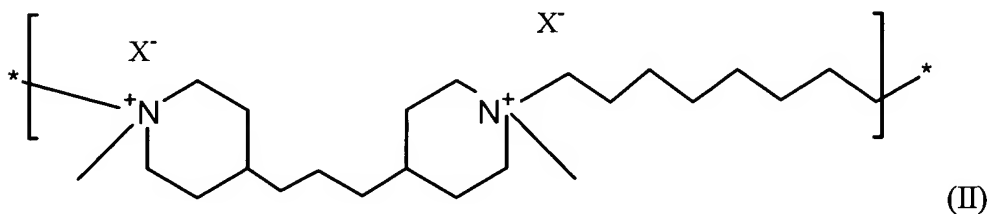
1. A polymer or copolymer characterized by a repeat unit having the formula:



wherein R_1 is a substituted or unsubstituted lower alkylene group; R_2 and R_3 are each independently hydrogen or a substituted or unsubstituted lower alkyl; A is a bond or a substituted or unsubstituted lower alkylene group; and each X^- , separately or taken together, is a physiologically acceptable anion.

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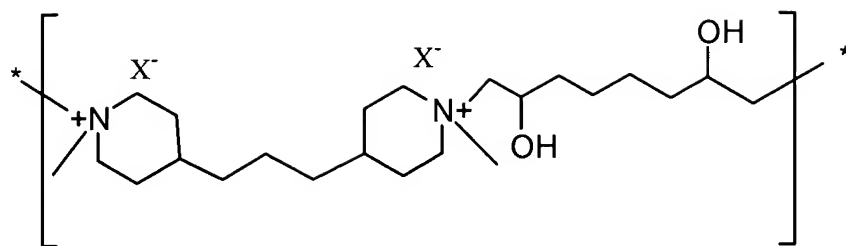
2. The polymer or copolymer of Claim 1 wherein the polymer or copolymer is characterized by a repeat unit of formula II, III or IV:



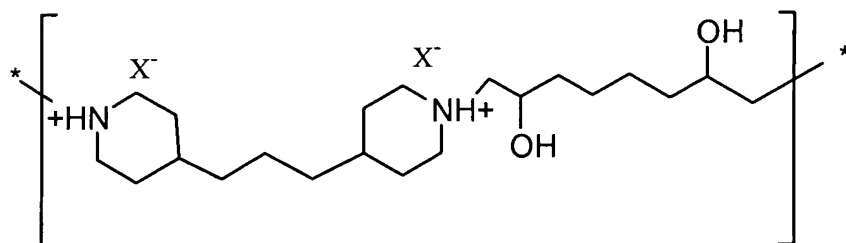
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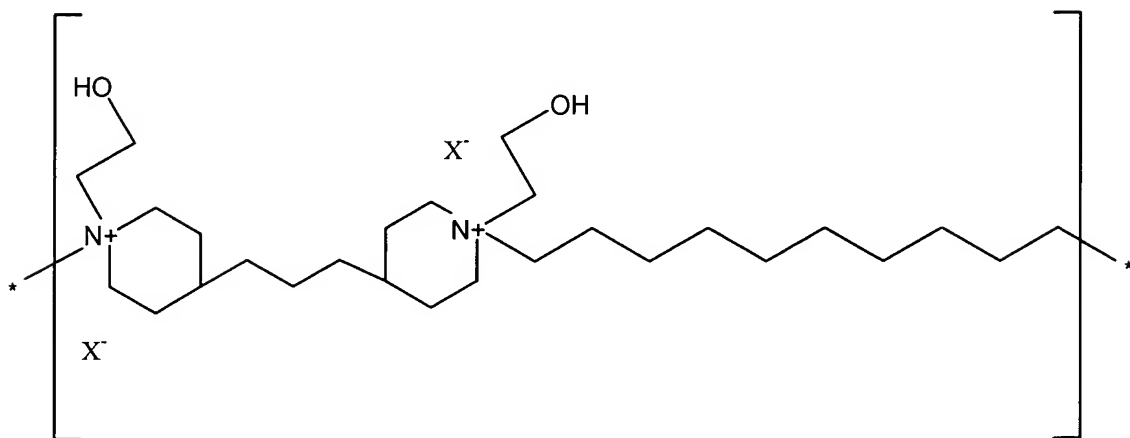
-38-



(V)



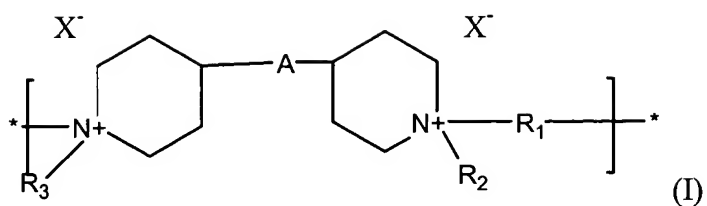
(VI)



(VII).

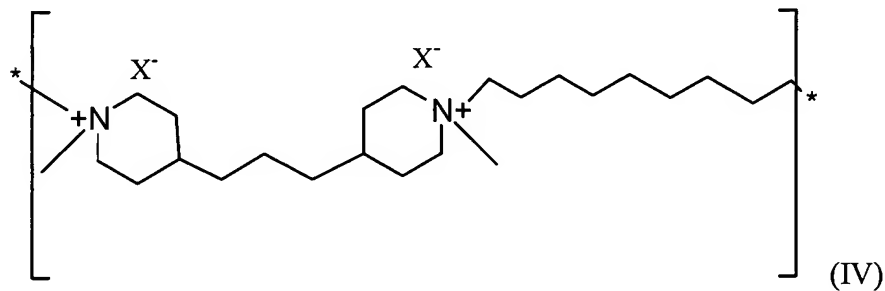
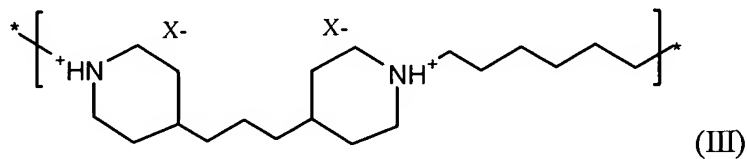
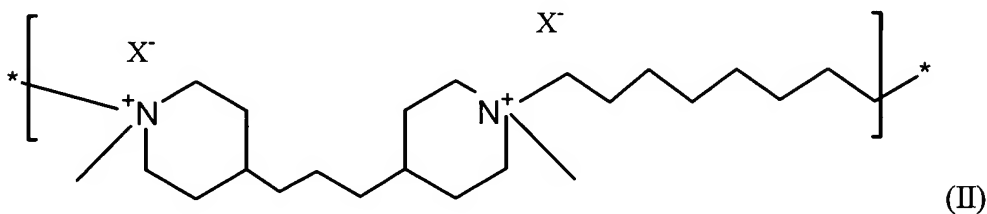
- 10 3. A pharmaceutical composition comprising a polymer or copolymer characterized by a repeat unit having the formula:

-39-



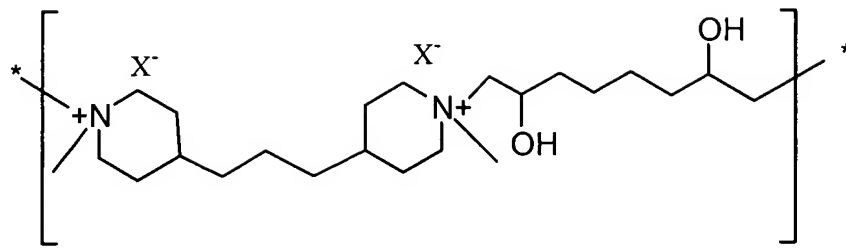
- wherein R_1 is a substituted or unsubstituted lower alkylene group; R_2 and R_3 are each independently hydrogen or a substituted or unsubstituted lower alkyl group; A is a bond or a substituted or unsubstituted lower alkylene group and each X^- , separately or taken together, is a physiologically acceptable anion; and a physiologically acceptable diluent or carrier.

4. The pharmaceutical composition of Claim 3 wherein the polymer or copolymer is characterized by repeat units of formula II, III or IV:

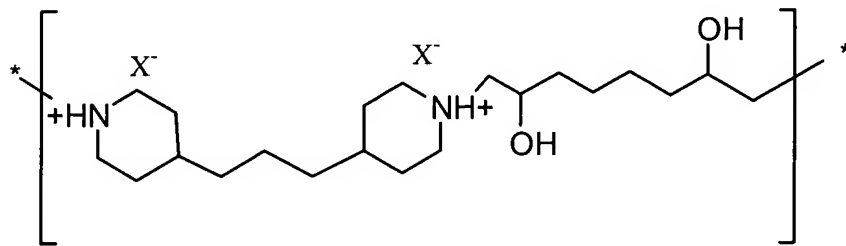


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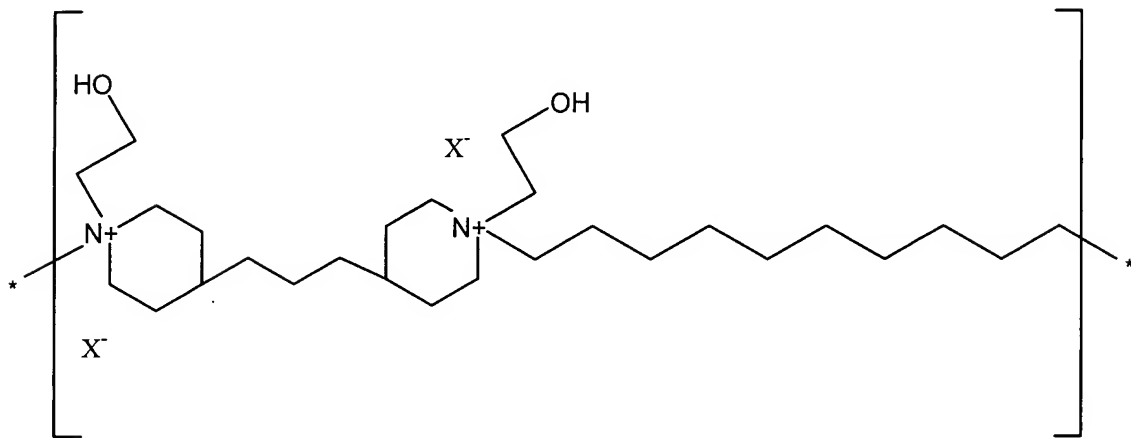
-40-



(V)



(VI)



(VII).

- 10 5. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 1.

6. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 2.

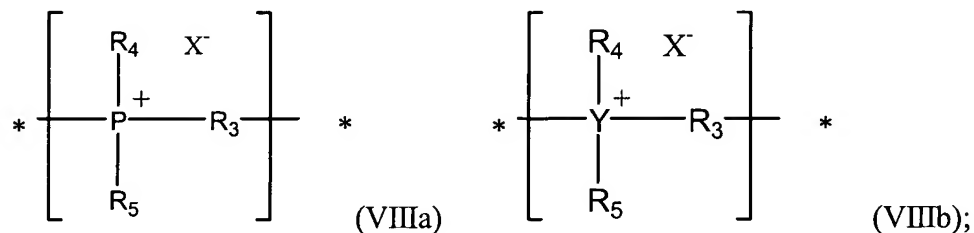
5 7. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 3.

8. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 4.

9. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 1.

10. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 2.

11. A polymer or copolymer characterized by a repeat unit of formula VIIIa and a repeat unit of formula VIIIb:

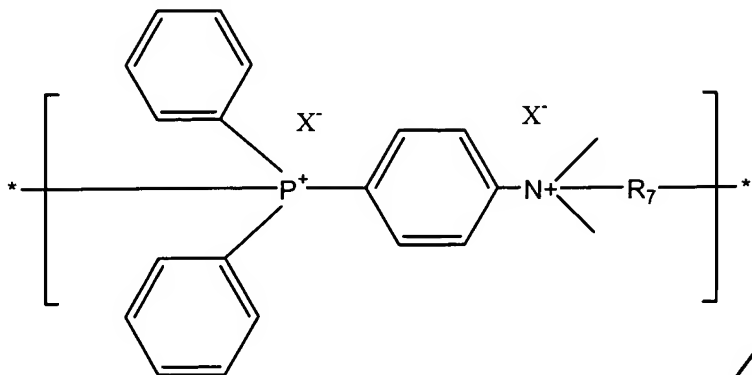


wherein Y is P or N; R₃ is a substituted or unsubstituted arylene or lower alkylene

group, R₄ and R₅ are independently a substituted or unsubstituted aliphatic or aromatic group; and each X⁻ in the polymer or copolymer, separately or taken together, is a physiologically acceptable anion.

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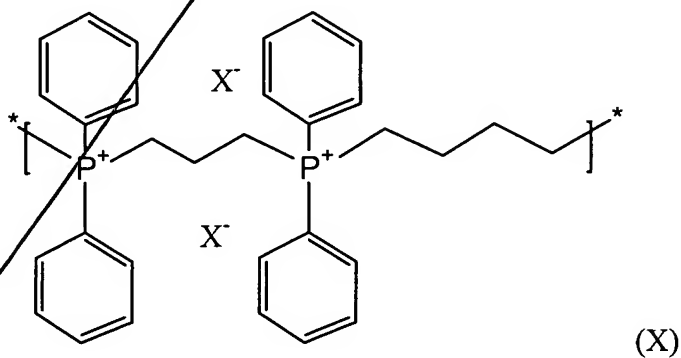
12. The polymer of copolymer of Claim 11, wherein the polymer or copolymer is characterized by repeat units of the formula:



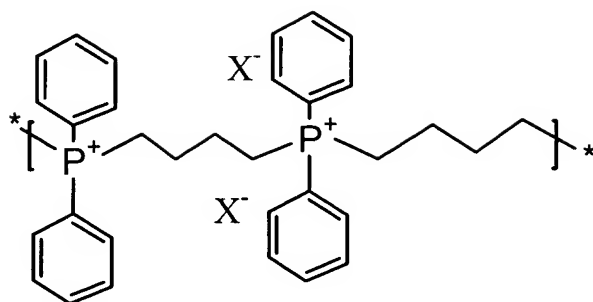
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wherein R_7 is a substituted or unsubstituted lower alkylene group having from 1 to about 24 carbon atoms and each X^- , separately or taken together, is a physiologically acceptable anion.

- 10 13. The polymer of copolymer of Claim 11 wherein the polymer or copolymer is characterized by repeat units of formula X or XI:

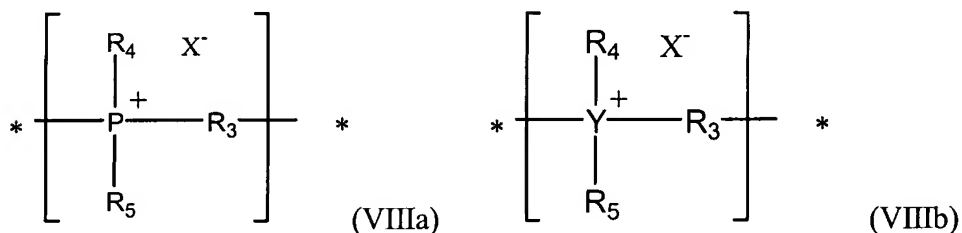


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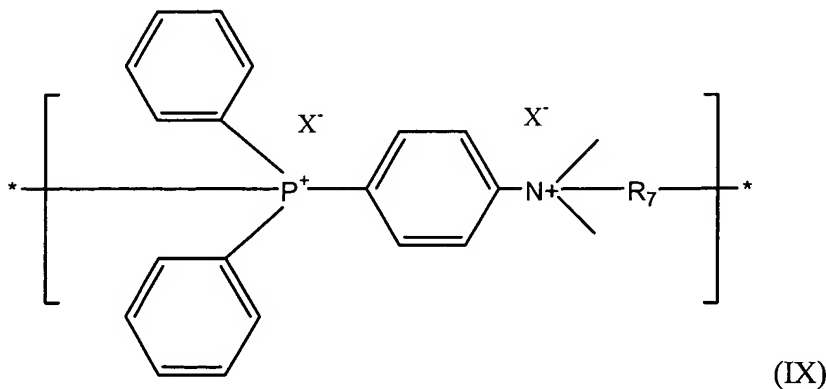
(XI).

14. A pharmaceutical composition comprising a physiologically acceptable carrier or diluent and a polymer or copolymer characterized by a repeat unit of formula VIIIa and a repeat unit of formula Vb:



wherein Y is P or N; R_3 is a substituted or unsubstituted arylene or lower alkylene group, R_4 and R_5 are independently a substituted or unsubstituted aliphatic or aromatic group; and each X^- in the polymer or copolymer, separately or taken together, is a physiologically acceptable anion.

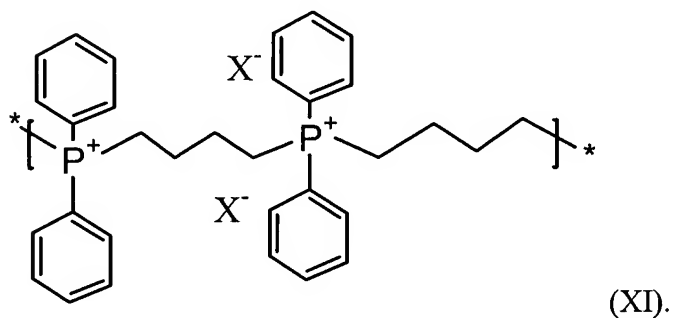
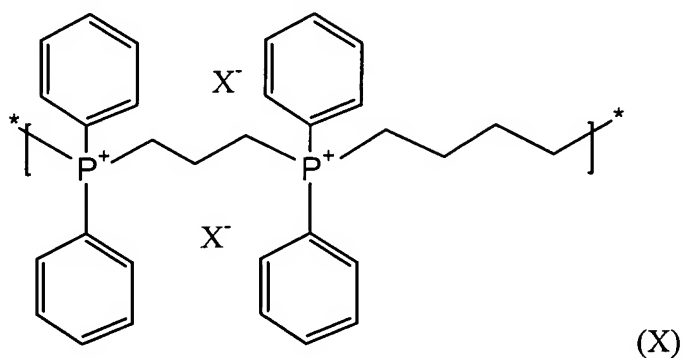
15. A pharmaceutical composition comprising a physiologically acceptable carrier or diluent and a polymer or copolymer characterized by a repeat unit of formula IX:



(IX)

wherein R_7 is a substituted or unsubstituted lower alkylene group having from 1 to about 24 carbon atoms and each X^- , separately or taken together, is a physiologically acceptable anion.

- 5 16. The pharmaceutical composition of Claim 14 wherein the polymer or copolymer is characterized by repeat units of formula X or XI:



10

17. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 11.

- 15 18. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 12.

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19. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 13.

5 20. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 14.

10 21. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 15.

15 22. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 16.

20 23. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 11.

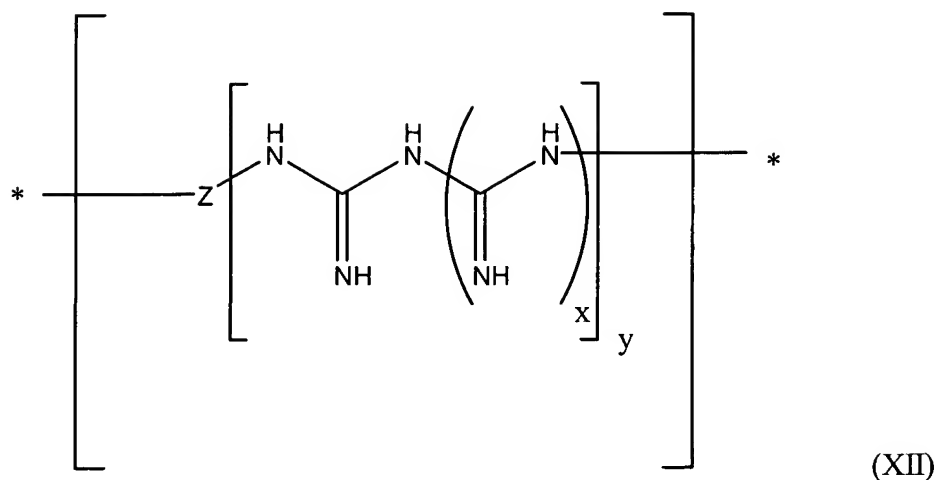
24. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 12.

25 25. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 13.

26. A polymer or copolymer characterized by a repeat unit having the formula:

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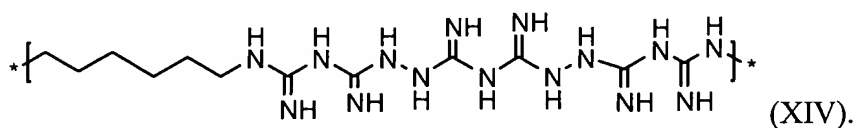
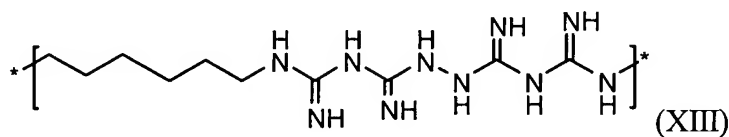
-46-



and physiologically acceptable salts thereof, wherein Z is a substituted or unsubstituted lower alkylene or lower alkylene glycol group; x is an integer from 1-4; and y is an integer from 2-5.

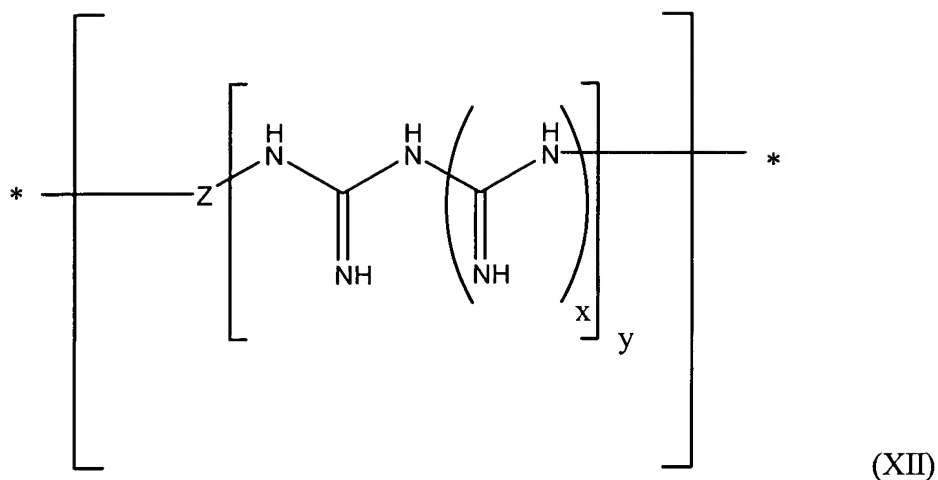
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27. The polymer or copolymer of Claim 26 wherein the polymer and copolymer are characterized by repeat units of formula XIII or XIV:



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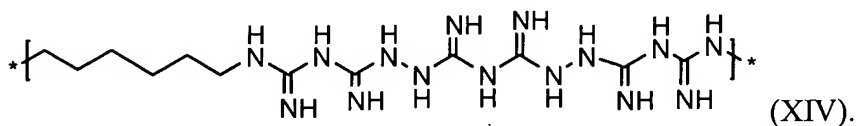
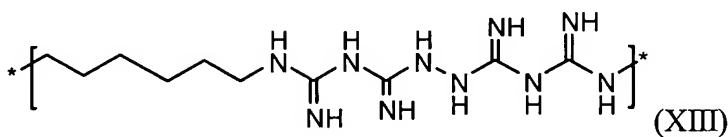
28. ✓ A pharmaceutical composition comprising a physiologically acceptable diluent or carrier and a polymer or copolymer characterized by a repeat unit having the formula:



or a physiologically acceptable salts thereof, wherein Z is a substituted or unsubstituted lower alkylene or lower alkylene glycol group; x is an integer from 1-4; and y is an integer from 2-5.

5

29. The pharmaceutical composition of Claim 28 wherein the polymer or copolymer is characterized by repeat units of formula XIII or XIV:



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30. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 26 or a pharmaceutically acceptable salt thereof.

15 31. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 27 or a pharmaceutically acceptable salt thereof.

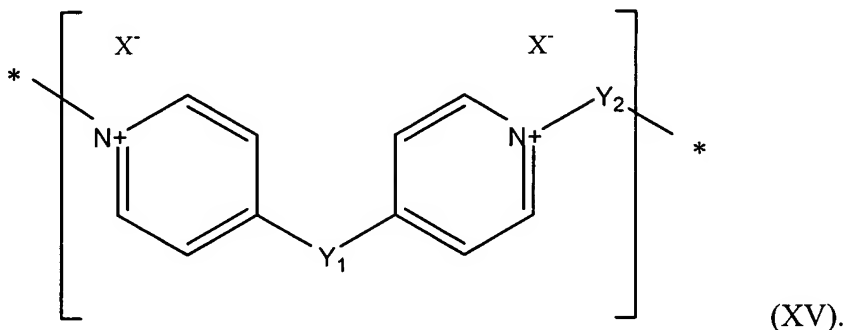
32. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 28.

5 33. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 29.

34. A method of inhibiting the growth of a microorganism on a surface comprising
10 the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 26 or a pharmaceutically acceptable salt thereof.

35. A method of inhibiting the growth of a microorganism on a surface comprising
15 the step of contacting said surface with an effective amount of a polymer or copolymer of Claim 27 or a pharmaceutically acceptable salt thereof.

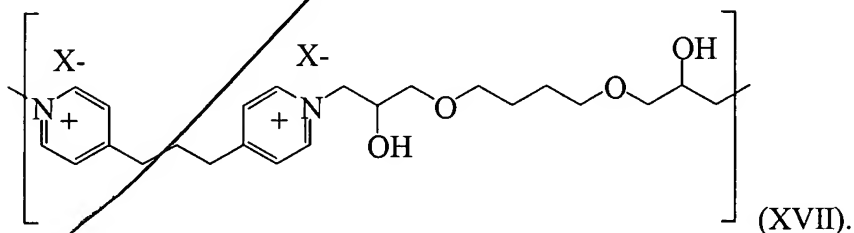
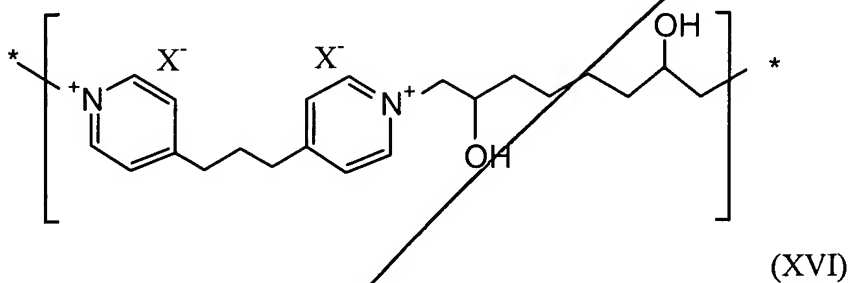
36. A polymer or copolymer characterized by a repeat unit having the formula:



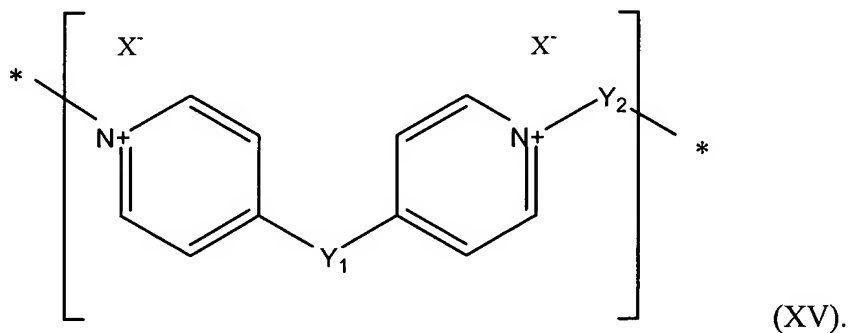
20 wherein Y_1 and Y_2 are independently a lower alkylene or lower alkylene glycol group, provided that Y_2 is substituted with two or more alcohol groups; each X^- , separately or taken together, is a physiologically acceptable anion; and said polymer or copolymer is substantially free of diphenol.

25 37. The polymer of Claim 36, wherein said polymer is a homopolymer.

38. The polymer or copolymer of claim 36 wherein the polymer or copolymer is characterized by repeat units of formula XVI or XVII:



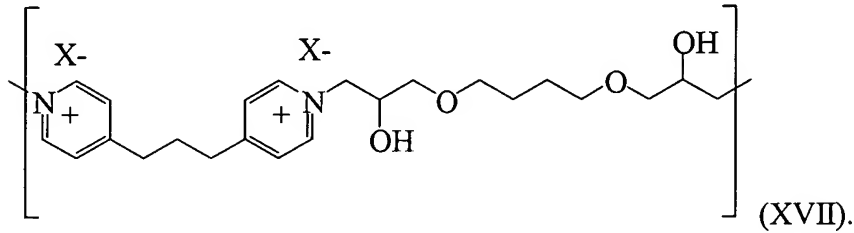
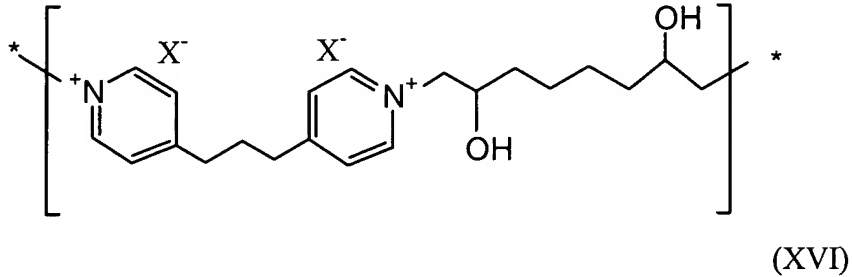
- 10 39. A pharmaceutical composition comprising a physiologically acceptable carrier or diluent and a polymer or copolymer characterized by a repeat unit having the formula:



- 15 wherein Y_1 and Y_2 are each independently a substituted or unsubstituted lower alkylene or lower alkylene glycol group; and each X^- , separately or taken together, is a physiologically acceptable anion.

40. The pharmaceutical composition of Claim 39, wherein at least one lower alkylene or lower alkylene glycol group represented by Y₁ and Y₂ is substituted.

41. The pharmaceutical composition of Claim 39, wherein the polymer or
5 copolymer is characterized by repeat units of formula XVI or XVII:



42. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a polymer or copolymer of Claim 36.

43. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a homopolymer of Claim 37.

- 20 44. A method of treating a microbial infection in a mammal comprising the step of
administering to said mammal a therapeutically effective amount of a polymer or
copolymer of Claim 38.

Keywords:

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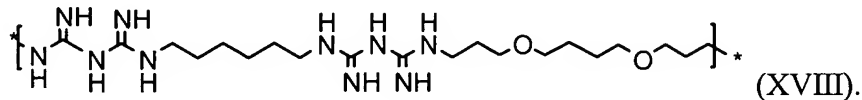
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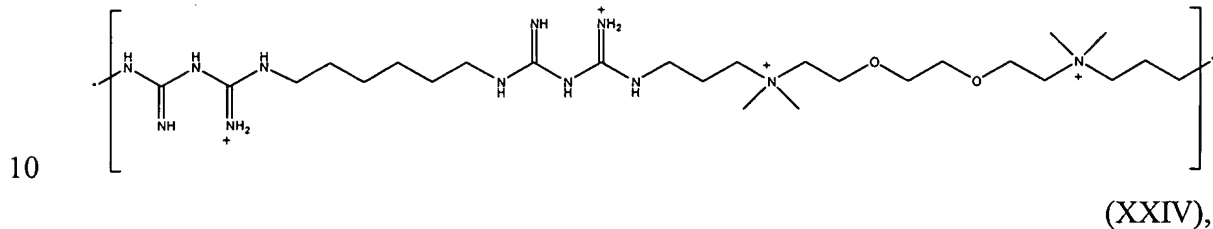


and physiologically acceptable salts thereof.

52. ✓ A pharmaceutical composition comprising a polymer, copolymer or a physiologically acceptable salt thereof, and a pharmaceutically acceptable carrier or diluent, wherein the polymer and copolymer are characterized by a repeat unit having the formula:

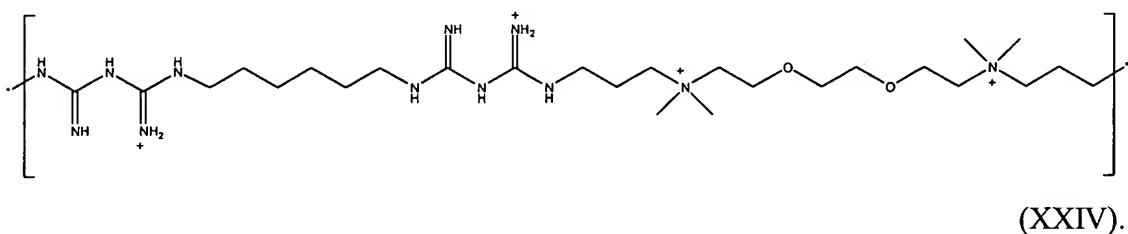


53. A polymer or copolymer characterized by a repeat unit having the formula:



and physiologically acceptable salts thereof.

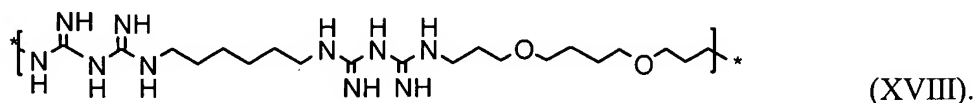
54. A pharmaceutical composition comprising a polymer, copolymer or a physiologically acceptable salt thereof, and a pharmaceutically acceptable carrier or diluent, wherein the polymer and copolymer are characterized by a repeat unit having the formula:



55. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 52.

56. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer, copolymer or physiologically acceptable salt thereof, wherein the polymer or copolymer is characterized by a repeat unit having the formula:

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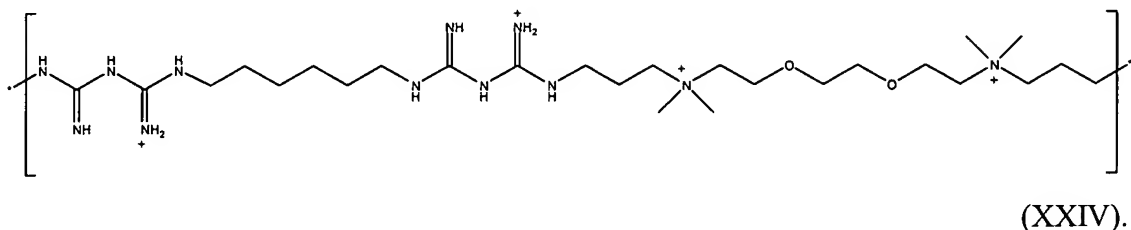


57. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of claim 54.

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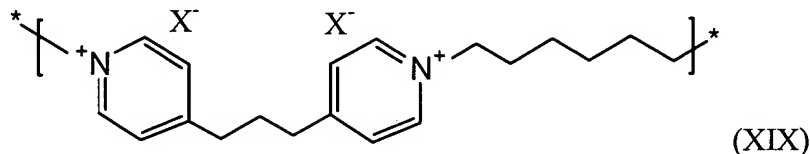
58. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer, copolymer or physiologically acceptable salt thereof, wherein the polymer or copolymer is characterized by a repeat unit having the formula:

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59. A pharmaceutical composition comprising a polymer or copolymer characterized by a repeat unit having the formula:

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and a pharmaceutically acceptable carrier or diluent, wherein each X⁻, separately or taken together, is a pharmaceutically acceptable anion.

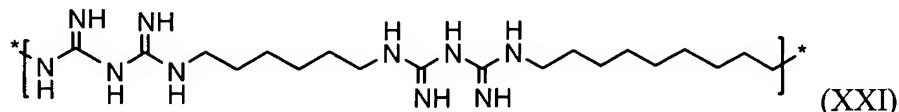
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60. A method of treating a microbial infection in the gastrointestinal tract of a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of claim 59.

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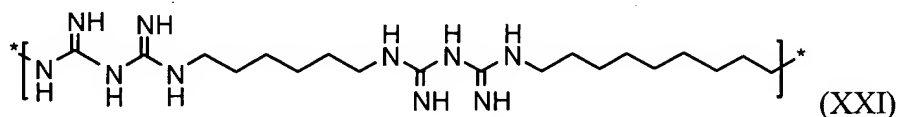
61. A polymer or copolymer characterized by a repeat unit having the formula:



and physiologically acceptable salts of the polymer and copolymer.

10

62. A pharmaceutical composition comprising a polymer, copolymer or a physiologically acceptable salt thereof, wherein the polymer or copolymer is characterized by a repeat unit having the formula:



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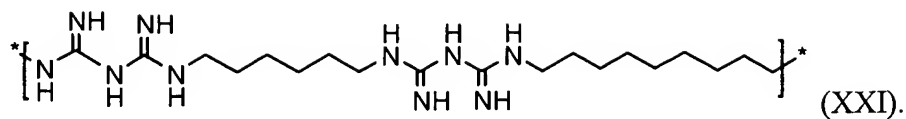
and a pharmaceutically acceptable carrier or diluent.

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63. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of Claim 62.

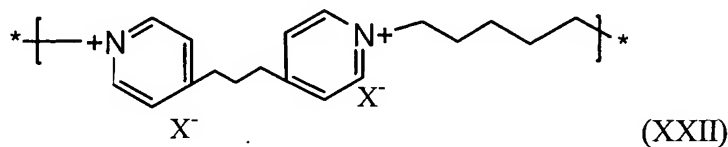
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64. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a polymer, copolymer or physiologically acceptable salt thereof, wherein the polymer or copolymer is characterized by a repeat unit having the formula:



65. A pharmaceutical composition comprising a polymer or copolymer characterized by a repeat unit having the formula:

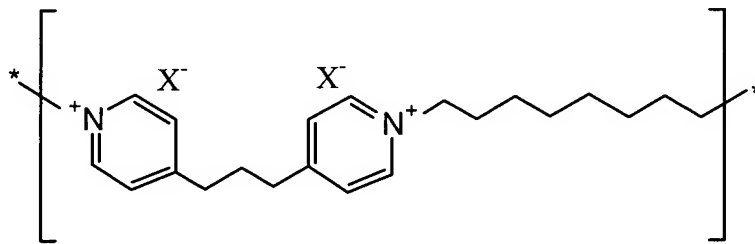
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and a pharmaceutically acceptable carrier or diluent, wherein each X^- , separately or taken together, is a physiologically acceptable anion.

66. A method of treating a microbial infection of the oral mucosa or gastrointestinal tract of a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of claim 65.

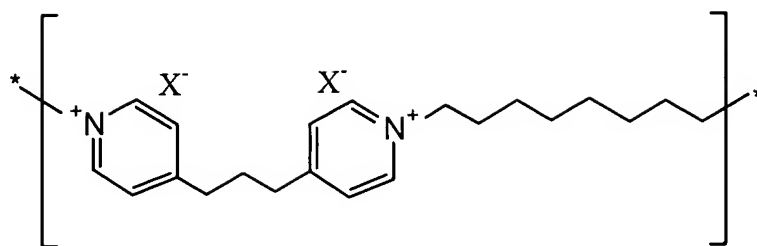
- 15 67. A copolymer characterized by a repeat unit having the formula:



(XIII)

wherein each X^- , separately or taken together, is a physiologically acceptable anion.

68. A pharmaceutical composition comprising a polymer or copolymer characterized by a repeat unit having the formula:



(XXIII),

and a pharmaceutically acceptable carrier or diluent, wherein each X^- , separately or taken together, is a physiologically acceptable anion.

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69. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a copolymer of claim 67.

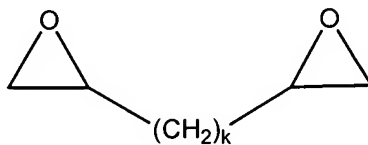
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70. A method of treating a microbial infection in a mammal comprising the step of administering to said mammal a therapeutically effective amount of a pharmaceutical composition of claim 68.

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71. A method of inhibiting the growth of a microorganism on a surface comprising the step of contacting said surface with an effective amount of a copolymer of claim 67.

72. A method of preparing an ionene polymer, comprising the step of reacting an α,ω -diaminoalkane, a diepoxide represented by the formula:

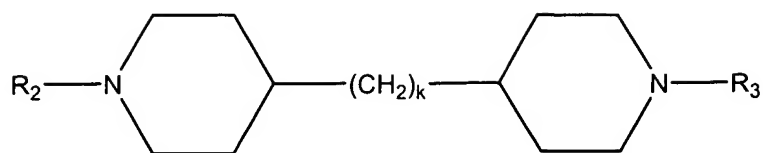


wherein k is an integer from 1 to 10, and an acid.

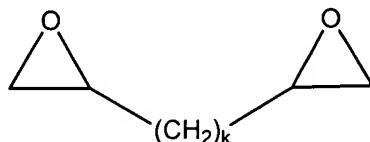
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73. A method of preparing an ionene polymer, comprising the step of reacting an α,ω -alkylenedipiperidine represented by the formula:

-57-



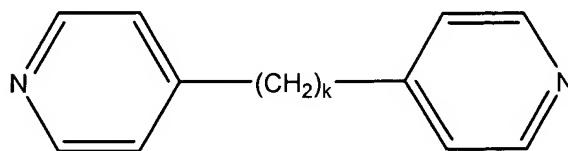
wherein k is an integer from 1 to 10 and R₂ and R₃ are each independently hydrogen or a substituted or unsubstituted lower alkyl group, a diepoxide represented by the formula:



5

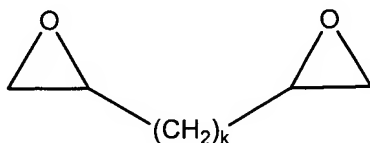
wherein k is an integer from 1 to 10, and an acid.

74. A method of preparing an ionene polymer, comprising the step of reacting an α,ω -alkylenedipyridine represented by the formula:



10

wherein k is an integer from 1 to 10, a diepoxide represented by the formula:



wherein k is an integer from 1 to 10, and an acid.

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